ON

INFANT-FEEDING

AND THE

VALUE OF PREPARATIONS

OF

PURE ALPINE MILK.

BY

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On the Causes of Mortality of Children.

The progress of a child depends on many circumstances. First of all, proper nourishment in the form of mothers' milk, or, where this is wanting, the best substitute for it. Then proper care and attention to all its wants, cleanliness, bathing, frequent change of linen, &c., &c. An equally important feature is a wholesome and well ventilated nursery, plenty of light and air, and south or west aspect. A child should be taken into the open air at least twice a day, morning and afternoon, but never at night. Infant life is very susceptible to the influences of the different seasons. It is well known that during summer more disturbances of digestion occur than during winter, accompanied by dangerous diarrhœa. This is partly accounted for by the deleterious effect of heat on foods. A most careful study of all these questions, and attention to the many wants of the delicate infant's life should be given by the intelligent mother, for the origin of many

insidious diseases is traced to carelessness or neglect.

But, above all, the proper nourishment of the child is the main point.

The human being requires but a few elements for the development and sustenance of his body. These elements are—albuminous bodies, fat, carbohydrates, and certain nourishing salts.

Only in the capacity of digesting and assimilating these elements the child differs materially from the adult. This is owing to the chyle, which the alimentary canal of the child secretes in a far larger quantity than that of the adult. The saliva, which is the first factor in the digestion of the amylaceous carbohydrates, only becomes appreciably active in the second month of life, increasing each succeeding month. The pancreas is only very slightly active during the first year, and commences only to participate in the digestive action during the second year. The gastric juice has, during the first months, almost of itself, to overcome the digestion of the albuminoids. The pepsin of the gastric juice converts the albuminous bodies into a soluble form, *i.e.*, peptones. The albumen of the milk, for instance, is the casein. If a child does not well digest the milk, *i.e.*, if the pepsin of the child's stomach does not sufficiently dissolve this albuminous body, then the child vomits the milk in the shape of the known sour curds, or it passes *per anum* undigested, and the stool has a

lumpy appearance instead of being uniformly softish.

The Natural Feeding of Children.

Mothers' milk is, of course, the food which contains the necessary elements for the building up of the child's organism in the best possible and suitable form, and all artificial foods must, in their composition, strictly adhere to that natural food, and try to imitate it as closely as possible. According to reliable tests, mothers' milk contains, on the average, in 100 parts 88·7 parts of water, 2 of casein, 5 of fat, 4·5 of sugar, 1·38 salts (especially potassium phosphates).

The child ought to become accustomed to order, even in feeding. During night no child ought to be fed, or only exceptionally. Invalid, sickly, and specially tuberculous mothers, ought not to give the breast to their children in their own interest. The return of the period does not forbid suckling a child, but certainly a renewed pregnancy. The weaning ought to take place with the cutting of the teeth, and ought not to be postponed, especially during the hot summer months.

From that time a more solid food can be given. The appearance of the teeth is an indication thereof. The food may be more and more similar to that of the adult: it ought to contain fat and peptone, *i.e.*, easily digestible albuminoids, biscuits, milk, milk-sugar, and bone-forming salts. This sort of

nourishment is suitable for the second year, to be followed by gravy-soups, broth, eggs, &c., &c., in natural sequence similar to that of the adult.

This, in a few words, is the natural feeding of the child, first: mothers' milk, then a sort of happy medium between that and the food for adults.

There are, however, numerous cases in which mothers' milk is not available in the first instance, neither can the above sketched medium diet be given. Unhappily these cases are by far the majority under existing social conditions, and every care and attention of the children's friends, the doctor and the technologist, ought to be concentrated in the task to procure the right substitute for the natural food. This is called artificial nourishment, which is synonymous with the nourishment in itself of the adult. Artificial nourishment is only called so in order to indicate the difference between it and the nourishment by the mother or wet-nurse. It is necessary, in the making of artificial foods, to consider each component part of mothers' milk, according to its properties, and in reference to the organs of digestion of the child, and to examine closely how far it can be substituted as regards its qualities, and its amount present in mothers' milk.

Starch-containing foods are to be entirely excluded during the first three months. The most practical substitute for mothers' milk is—1. fresh cow's milk; 2. unsweetened condensed milk; or, still better,

3. peptonized Alpine cow's milk, and, under certain conditions, milk biscuits made on certain principles, to which I shall revert further on.

The so-called Artificial Feeding of Children.

Many causes, on which it is unnecessary to dilate here, prevent mothers suckling their babies.

If a child in its first years, during which a healthy foundation ought to be laid of muscle and bone, and all tissues and blood-vessels for their development during life, is brought up with food which does not supply the necessary elements to this end, or not in the form and quality capable of being absorbed by the organs of digestion, then often a condition arises resulting in maladies, which are nothing but the sequences of defective and unsuitable feeding. I would only mention here: difficult and slow cutting of the teeth, further rachitis, when the want of nourishing salts impedes the hardening of bone; scrophulosis, anæmia, chlorosis, &c., with their attendant consequences. When, in these cases, the doctor is at last called in, it is frequently already too late, his task has become impossible, and the child sinks into a permanent decline. Such conditions are deplorable, but they can then no longer be altered. But science, experience and practical knowledge are called upon to prevent this, and to supply the infant with foods which are perfect substitutes for the absent natural one.

The artificial food—if it is to fulfil its purpose—must be able to supplant the natural one entirely and completely. Let us here examine the means hitherto most in use to replace mothers' milk.

The most usual substitute is cow's milk. And twenty years ago Biedert has established the fact that the casein of cow's milk is far more difficult to dissolve by the pepsine of the child's stomach than that of mothers' milk. The most important difference between the two kinds of milk, is that mothers' milk is made to coagulate, if only imperfectly through small quantities of gastric juice, but by the addition of larger quantities again dissolves, whilst cow's milk remains coagulated, whatever the proportion of gastric juice may be. Apart from the heterogeneousness of this albuminoid, so important for nourishment, in both kinds of milk, and their solubility in the child's stomach, the amount present is also different, in the proportion of 5 to 4 in cow's and mothers' milk.

Goat's milk is nearly equal to cow's milk. If the pure cow's milk is used for bringing up a child, it is well to dilute it with a mucilaginous decoction of cereals (barley, oats, rice), owing to their favourable action in intestinal catarrh, and because they contain the nitrogenous principles and salts. Further, a small addition of sugar is allowed under certain conditions, in order to prevent constipation, milk sugar being preferable; lastly, phosphates, especially lime, for the formation of bone.

All these requirements, besides the partially dissolved casein of the cow's milk through the action of pepsine, so as to render it very easily digestible, are represented in Loeflund's peptonized Kindermilch, and his powdered milk biscuits, on which more anon.

The second much used substitute for the natural food of infants is the condensed milk preserved by cane sugar. This, of course, indicated a certain progress in artificial foods, and many children have been brought up on it. Only gradually the drawbacks of this milk became known, which, apart from the shortcomings of cow's milk mentioned above, contains a highly objectionable proportion of sugar, up to 40 % its weight. Not only such a large proportion of cane sugar may cause intestinal catarrh, and very considerable disturbance of digestion, but it also does not afford a proof of the complete sterilization of the organisms which cause the decomposition of the milk.

Next comes Biedert's artificial cream mixture. This is a mixture of butter, potash, albumen, and sugar, as also the salts of human milk. Through solution in water a milk can be made, which corresponds to the natural requirements as to kind, proportion and adjustment of principles, but Biedert himself admits that it is too dear to become of general use.

Many other substitutes for mothers' milk are in circulation, amongst them Liebig's Infants' Meal

(*Kindersuppe*), and various infants' foods. Very conscientious observations and judgments of experienced children's doctors are extant, which more or less agree that the first-named product, if made according to Liebig's original prescription, does not agree in obstinate diarrhœa, sometimes *causes* diarrhœa, that it cannot be taken undiluted during the first months, that it does not contain sufficient milk-fat, and that, finally, cow's milk, suitably prepared, fulfils the same purpose.

A maker of a certain infants' food pretends that it contains four times as many carbohydrates and nourishing salts as mothers' milk ! This, according to my opinion, is no advantage. Moreover, the need of fat for the child is not considered, neither in Liebig's nor other infants' foods, and Zweifel has the merit of having first proved that the whole contents of a child's stomach fed on that food was nearly all starch. If that were a sufficient food for a child, it might as well be fed on starch alone, which is far cheaper, compared to which the price of that food would be proportionately exorbitant. Reliable observations have also proved, that a constant use of these and many other similar infants' foods, have in the end caused in many cases grave disorders of the digestive organs, that furthermore children fed thereon, were, during the second year, frequently attacked with rachitical complaints, rendering them in later

years less fit to battle with illness, than rationally fed children.

Amongst the much advertised foods, several seek to recommend themselves by distorting facts and principles and trading on well-known names. One maker pretends to say that the sugar of malt-extract causes diarrhœa and flatulence, that peptonized food causes atrophy of the unemployed glands, as if predigested food were nothing but peptone, or the experience of every physician did not prove the absurdity of the former statement. Another food consists of only biscuit mixed with malt-extract, and without milk. Another, an American product, is made with dextrine and dessicated milk, powdered and peptonized, having a faint dextrine taste, costing very little and sold at very high prices.

I would still say a word respecting the legumes, which, mostly mixed with wheat- or maize-flour and very finely powdered, are on the market as additions to milk. Of course the vegetable albumen existent to a certain degree in the husks enhances the food value of a child's meal prepared therewith, but it requires a sound stomach, and is only fit to be taken when the child is older, as the nutritious principles of such a flour, ever so finely ground, remain chemically unsolved, and therefore difficult to digest.

There are principally three sorts of nutritious elements, which in most foods, comparatively

excellent as they may appear to be, either are absent or not present in the right form, that is: easily digestible:—

Firstly: The necessary amount of fat.

Secondly: The phosphates of the nourishing salts, so indispensable for the building up of the framework.

Thirdly: The albuminous elements, so important for forming blood.

Each rational artificial food must unconditionally fulfil these chemical requirements. It must also be cheap, good and tasteful, easy to handle, and keep well. Furthermore, the child must progress on it and gain in weight at the same ratio as the one fed on mothers' milk. Only a careful and continued weighing during several months can decide on the positive value, or the contrary, of a food and real or apparent success or error.

The Preparations from Pure Alpine Milk.

Having in the preceding pages cursorily touched on the more or less known artificial foods, and the indispensable virtues which experience and science expects from them, I now pass on to Loeflund's infants' preparations which involve the principle, to utilize fresh Alpine milk in suitable form and composition according to the age of the child for its proper nourishment, and on which during a number of years of my practice amongst children, I have made observations and gathered experience.

1. Loeflund's pure Bavarian Mountain Cream Milk.

The great advantage of this milk over all other preserved milks is that we have here a pure Alpine milk of the province of Allgäu (Bavarian fore-Alps) exactly as it comes from the cow, condensed without any addition whatever, and *sterilized.* This last procedure appears to me to be the main point, for it has been shown by reliable observations, that the use of impure milk, or of such coming from infected animals, has frequently been the cause of very dangerous maladies. I would here call to mind the typhus-epidemics of Huncoat and other places. Power reports on the relation of bad milk to diphtheria and scarlet fever, in cases of scrofulosis and tuberculosis after taking milk from infected cows, which are numerous. The milk from the milk-diet establishments (*Kuranstalten*), where the cows are under strict competent control, may almost be guaranteed as a pure product, but the fact that the cows there are stable-fed, renders the milk inferior to the pure Alpine milk from the Bavarian mountains, as the former mode of feeding cannot be compared with the juicy pasturage of the "Alm," and cannot give the aromatic product of the fragrant Alpine herbs. On such an "Alm" where the cattle pass day and night in the open, the mountain climate, the purity, the coolness and rarefied air, all contribute to render the milk almost

free from microbes. Nevertheless, in order to make quite sure, Loeflund's milk is subjected to a special sterilization process, and this procedure is such as to positively destroy every ferment or contagious matter, which may have been already in the milk or found its way into it from without. The process of manufacture in Loeflund's factory, near Harbatzhofen, which, during a recent excursion in Bavaria, I happened to visit, is briefly as follows, as witnessed by myself.

The milk is delivered by the farmers direct to the factory without any delay or interference of a middleman ; it is there examined as to purity and quality, and then condensed *in vacuo* at a low temperature to a one-third or one-fourth of its volume. After this the milk is filled into tins, scrupulously cleaned, and then soldered. Finally, the tins are exposed for a considerable time to boiling heat in the "sterilizator." This finishes the whole process, and the preserved milk is ready. In its appearance this condensed milk, diluted again with a corresponding quantity of water for use, is perfectly uniform, of light colour and excellent taste, and can in *no way be distinguished from boiled milk.* It is indeed nothing else, no substitute nor preparation treated with chemicals, but unadulterated concentrated pure Alpine milk. Therein lies its only and greatest value in contradistinction to all other condensed milk.—*Deutsche Medizinal-Zeitung* number 80/87.

To this milk everything I have above said respecting pure cow's milk also applies, including its value for the feeding of children.

Good pure milk is one of the conditions of life, certainly for the child, especially in a form made easily digestible, to which I shall presently refer. It is irreplaceable as a diet for the sick and convalescent, an enjoyable food for the healthy. For infant feeding generally, for invalids, for hospitals, the household, as well as for provisioning during long voyages and in war, this kind of preserved milk marks an eminent progress, and wherever a pure aromatic delicious Alpine milk is required, Loeflund's preparation recommends itself, the more so as it is far cheaper, according to its intrinsic value, than *sweetened milk.*

2. Loeflund's peptonized Kindermilch with Wheat Extract for Infants during the first five to six months.

Frequently cases occur in infant feeding, where cow's milk, and even now and then mothers' milk, is not retained by the stomach, or only partially digested. Vomiting of sour curd and abnormal evacuations (called lumpy), indicate disturbance of digestion caused by the milk, or rather by the casein of the milk. Usually all sorts of mucilagenous remedies are employed in such cases, but it is well to go back as soon as possible to the

feeding with milk. This is only possible if the casein has been reduced to a state of solubility, as it is done in the stomach by the pepsine. It is, however, only a question of enacting the first step of the converting process, I would say to inaugurate the preparatory stage, as the child's gastric juice will also perform its function.

The great advantages of this preparation are— 1. The excellent Alpine milk employed. 2. The treatment of the casein so as to secure its easy assimilation by the child's stomach. 3. The addition of the wheat extract in such a way as it could not be more effective or nourishing by any admixture of a mucilagenous or similar article. More especially the richness in milk fat of the excellent Alpine milk is of the greatest importance for the progress of the child, and an experiment made by Biedert in that respect is very interesting. According to him a child nourished with food containing only $\frac{1}{2}$ % fat decreased in 4 days 166 grammes; with 1 % fat in 13 days 342 grammes; but with $1\frac{4}{10}$ % in 14 days it gained 630 grammes. But the Alpine milk, even during winter, when the amount of milk-fat is lowest, averages $3\frac{1}{2}$ % milk-fat, and I am therefore of opinion that a food made with such a milk-sterilized, and rendered easily digestible for the tender power of assimilation by the child, answers all requirements in their widest sense.

3. Loeflund's Milk Biscuits (powdered) made with peptonized Alpine Milk, for Children of about four months up to two years.

Loeflund's Alpine Milk Biscuits (powdered). For children sufficiently developed to require a more substantial food besides milk, the choice of such a food is important.

Fed on the ordinary biscuits and the various foods on the market, made of all kinds of cereals, many a robust child may grow up, although frequently enough flatulence, disturbances of digestion and other irregularities occur which may impair the growth and development of the child later on, but which are left unnoticed for the time being.

The only proper food for children must contain albumen, milk-fat, carbohydrates and salts, in proper quantity and right proportion.

It must have a certain consistency, must be easily digestible and really nourishing, but not overload the stomach; and, above all, it must contain the necessary salts for the formation of muscle and bone.

On these principles, and fulfilling all requirements, Mr. Loeflund's Alpine Milk Biscuits are made. The splendid rich milk of the Bavarian Alps is treated *in vacuo* with wheat-extract, and then baked with wheaten flour to a biscuit. A full quarter of the contents of the ready product consists of pure dry milk substance, *i.e.* milk-fat,

solved caseine, milk-sugar and phosphoric salts. The wheaten flour is dextrinized by the process of baking, so that it can be easily digested and will never produce acidity.

The value of these biscuits lies in their composition and process of manufacture. They are more nourishing and blood-producing than any similar product, owing to the excellent quality of the ingredients and the high percentage of milk-fat which is absolutely necessary for such a food. They are of easiest digestion, all the raw materials used being in a state of solubility: of the highest importance are the bone-forming elements, viz. the phosphoric salts, especially lime, which forms the principal part of the human frame and must be introduced into the organism during the first years of life, otherwise the development of the child is impeded from the beginning.

The product is exceedingly palatable and agrees with almost every child; it is cheap and simple of preparation; it is uniform, free of microbes and never becomes sour.

According to my experience, Loeflund's products have proved efficient and trustworthy in every single case under my notice, and I have many practical proofs under my own eyes, founded on periodical weighing of the children and their visible progress. Taking the average weight of a child at its birth at 3300 grammes, the rule is, that it decreases 120 grammes during the first

days of existence, recovering this loss, however, after ten to twelve days, and trebles its weight during the first year. If this result is reached with an artificial food the effect may be considered satisfactory, and the food completely fulfils its purpose. This has been almost invariably attained with Loeflund's foods.

But not only with children, also with invalids and convalescents Loeflund's Alpine milk preparations are of a high hygienic value.

A further valuable product of Mr. Loeflund is his Condensed Cream Emulsion (*Cremor hordeatus*), which is nothing but the best fresh cream taken from the splendid milk of the Bavarian mountains, and emulsified with his pure Hordeum Malt Extract. It is a delicious and perfect substitute for cod-liver oil, and can be taken when the latter cannot. An English physician has written on this subject as follows:—

"The high value of cod-liver oil in the treatment of phthisis is a widely recognized fact. If the wasting consumptive can be enabled to assimilate fat the progress of the disease can usually be stayed.

"A certain amount of fat is essential for the building up of healthy tissue. When fat can be taken, and digested, the downward progress of the case of phthisis is reversed; and an upward direction given to it. Wherever there is defective tissue-development, that is, in the wide class

known medically as 'strumous,' the assimilation of fat is the aim of the physician. This applies as much to defective bone-development in the strumous child as it does to the development of lowly tissue-growth in the lungs of the adult, otherwise tubercle, or phthisis pulmonalis. The introduction of cod-liver oil has been a boon to this large class of individuals. Why? Because it is so easily assimilated. Not because there is any magic virtue in it. By its means many persons are enabled to take that fat requisite for healthy tissue-formation, who cannot digest other fats. The child which turns away with loathing from a piece of fat upon its plate will eagerly swallow the fishy oil. It is not a question of palate. This consideration will tell us of the importance of fat in the food.

"How is fat digested? Fat undergoes no change in the digestive act, except that of emulsification, *i.e.* of division and sub-division, until the particles are minute enough to enter the lacteals. Cod-liver oil undergoes this process of emulsification more readily than any other fat; though some other fats are perhaps more desirable for tissue-building if they could be assimilated. Nature furnishes a fat-emulsion in milk for the nutrition of young animals; and this is much more palatable than the fish-oil. If other fats can be taken and digested, there is no advantage to be gained by resort to cod-liver oil, which frequently is not assimilated, but is voided *per anum* unchanged and

en masse. In these last cases the fat must be taken in the form of an emulsion, so that the feeble digestive powers can deal with it. The importance of fat in the form of an emulsion needs no further illustration.

" Fat-emulsions are made artificially, but they do not keep well and in time separate. A fat-emulsion which will keep, which is readily digestible, and which can be produced in any quantity, has long been a desideratum with the growing class of persons whose fat-digestion is imperfect.

" Mr. Ed. Loeflund has met the difficulty by the production of his Condensed Cream Emulsion (*Cremor hordeatus Loeflundi*). The cream is taken from the best milk of the slopes of the Bavarian Alps, renowned for their herds. The cream is concentrated *in vacuo*, and preserved by the addition of a certain proportion of maltose. The compound is rich in fat, is acceptable to the most fastidious palate, being really in taste a confection, while the emulsion form of fat is not destroyed by the evaporation process. For those who cannot take cod-liver oil this preparation is of priceless value.

" It is put up in tins, sufficient for three or four days, and will keep for a fortnight without change after the tin has been opened. By laying in a stock of tins the imperfect assimilator of fat can travel anywhere, or go to sea, without being deprived of the necessary fatty food.

" Fat is not affected by the stomach and undergoes no change therein: its digestion does not commence until the stomach has been passed. Consequently, the fat must not be taken until the time of its digestion has arrived, that is, two or three hours after a meal. Introduced into the stomach at this time, it quickly passes out of it.

" The stomach is thus not offended by fat floating about it while its own proper work is going on; nor is there any splitting up of the fat into offensive fatty acids. For those who cannot take cod-liver oil this palatable fat-emulsion is invaluable.

" It is also invaluable during the hectic fever of phthisis; and in summer time, added to iced coffee, cocoa, chocolate, &c., it makes a most refreshing and invigorating food.

" The maltose is itself a food of high nutritive properties, and the combination is a perfect food, rich in fat, and of the smallest bulk. Being free from cane sugar, this preparation can be taken by persons who cannot take 'sweets' ordinarily, from the acidity to which they give rise."

The late Dr. Milner Fothergill, in the *Practitioner*, says:

" As it was clear the food must be small in bulk as well as nutritive in character, I advised the *Cremor hordeatus Loeflundi* in a small quantity—about the size of a filbert—every hour; with the result that the patient rallied and 'was much better.' Three months later she was still holding her own.—Miss U., a spinster, seen along with Dr. Walker, of Peterborough,

was put upon the dietary suggested above; one month after this, the report was—'she still sticks to the *Cremor hordeatus* and says she dare not take any solid food. Her sickness is much better, also the pains.' After the lapse of other six weeks she herself reports: 'I am going on quite as well as you led me to expect. I have made no material change in your dietary all this time and thoroughly enjoy it. This last is a great matter, for dyspeptics as a rule loathe the food they ought to eat.' She also alludes to the freedom from pain which she now experiences.—In another case, seen with Dr. Henderson of Coldstream, 'the limits of indigestion compatible with bare existence had been reached. The patient, a female of twenty-one, had been subjected to a long course of semi-starvation, with the result that the digestive powers were grievously impaired. She nearly fainted when being examined. She could take but very little food.' After six weeks, Dr. Henderson wrote as follows: 'I am attending our patient and am glad to say that the new line of treatment has made a wonderful change in her health.'"

I would add a few hints respecting the *regimen* to be followed in the rearing of children. It is of great importance not to overfeed a child, and particularly not to give it an artificial food in too concentrated a form. The stomach cannot support and digest more than the economy really requires. Too much does harm. Moderation is the first of all hygienic principles.

Order in feeding is another important point. During the first weeks every two hours, also during the night if the child cries. Later on, every three hours, and when six months' old only three times a day, with more substantial food, with a little liquid between, but then nothing at all during night. A child during the first weeks may have the bottle at

night several times, but later on let it cry unnoticed, as long as you are satisfied it is dry, or not tortured by insects, or in any other way inconvenienced. After a few nights it will cease crying.

Scrupulous cleanliness in everything is imperative for the child's well-being and progress, especially also as regards the bottle, the tube, the mouthpiece, which ought to be separated each time after use, and left in fresh water till they are used again. Bathing, fresh air and light are also important factors; but these are so self-evident that I need not further dwell on them in this little pamphlet.
